
USACE / NAVFAC / AFCEA UFGS-L-02741N (MARCH 2001)

Preparing Activity: LANTNAVFACENGCOM Use in lieu of UFGS-02741N

UNIFIED FACILITIES GUIDE SPECIFICATIONS

Use for LANTNAVFACENGCOM projects only

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SECTION 02741N

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09/99

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SECTION 02741N

BITUMINOUS CONCRETE PAVEMENT
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NOTE: This guide specification covers the requirements for the provision of a bituminous concrete overlay onto an existing pavement and the provision of a new bituminous concrete pavement in Virginia, North Carolina, Maryland, the District of Columbia, West Virginia, and Puerto Rico. This guide specification is not for use where high stability bituminous concrete pavement is required.

NOTE: Suggestions for improvement of this specification will be welcomed using the Navy "Change Request Forms" subdirectory located in SPECSINTACT in Jobs or Masters under "Forms/Documents" directory or DD Form 1426. Suggestions should be forwarded to:

Commander
Naval Facilities Engineering Command
Engineering Innovation and Criteria Office, Code EICO
1510 Gilbert Street
Norfolk, VA 23511-2699

Email: LantDiv@efdlant.navfac.navy.mil

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

NOTE: The following information shall be shown on the project drawings:

1. Extent of bituminous concrete overlay and bituminous concrete pavement required.
2. Typical overlay and pavement section showing thickness required.
3. Pavement marking plan (if required).

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 698	(1991) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft (600 kN-m/m))
ASTM D 1188	(1996) Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
ASTM D 1556	(1990; R 1996) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 2726	(1996; Rev. A) Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens
ASTM D 2922	(1996) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(1996) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

DISTRICT OF COLUMBIA DEPARTMENT OF TRANSPORTATION (DCDOT)

DCDOT HS (1974; R 1981) Highways and Structures

DEPARTMENT OF TRANSPORTATION (DOT)

DOT D-6.1 (1988) Uniform Traffic Control Devices for Streets and Highways

FEDERAL SPECIFICATIONS (FS)

FS TT-P-1952 (Rev. D) Paint, Traffic and Airfield Marking, Waterborne

MARYLAND DEPARTMENT OF TRANSPORTATION (MDOT)

MDOT CM (1993) Construction and Materials

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION (NCDOT)

NCDOT RS (1995) Roads and Structures

COMMONWEALTH OF PUERTO RICO, DEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS, HIGHWAY AUTHORITY (PRHA)

PRHA RBC (1989) Road and Bridge Construction

VIRGINIA DEPARTMENT OF TRANSPORTATION (VDOT)

VDOT RBS (1994) Road and Bridge Specifications

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION (WVDT)

WVDT DHSSRB 1993 Division of Highways Standard Specifications Road and Bridges

1.2 SUBMITTALS

NOTE: Where a "G" in submittal tags follows a submittal item, it indicates Government approval for that item. Add "G" in submittal tags following any added or existing submittal items deemed sufficiently critical, complex, or aesthetically significant to merit approval by the Government. Submittal items not designated with a "G" will be approved by the QC organization.

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-05 Design Data

Job-mix formula; G

SD-07 Certificates

Stone Base Course

Paint

1.3 QUALITY ASSURANCE

1.3.1 Modification to References

**NOTE: Select bracketed state reference based on the
location of the project.**

Except as specified herein or as indicated, work and materials shall be in accordance with the [VDOT RBS] [NCDOT RS] [MDOT CM] [DCDOT HS] [PRHA RBC] [WVDT DHSSRB]. The provisions therein for method of measurement and payment do not apply, and references to "Engineer" and "State" shall be interpreted to mean the "Contracting Officer" and the "Federal Government" respectively.

1.3.2 Job-Mix Formula

**NOTE: Select bracketed state reference based on the
location of the project.**

Submit the mix design, including mixing temperature, for approval. The mix design shall include a certified laboratory analysis of mix composition with marshall stability value, void content, and flow. After mix design approval, job mixes shall conform to the range of tolerances specified in [VDOT RBS] [NCDOT RS] [MDOT CM] [DCDOT HS] [PRHA RBC][WVDT DHSSRB]. An identical mix design previously approved within the past 12 months by the Atlantic Division, Naval Facilities Engineering Command, may be used without further approval, provided that copies of the previous approval are submitted. Obtain acknowledgement of receipt prior to bituminous concrete placement. Submit additional data regarding materials if the source of the materials changes.

1.4 ENVIRONMENTAL REQUIREMENTS

Do not produce or place bituminous concrete when the weather is rainy or foggy, when the base course is frozen or has excess moisture, or when the ambient temperature is less than 40 degrees F 4.4 degrees Celsius in the shade away from artificial heat.

1.5 BARRICADES AND SIGNALS

**NOTE: Include bracketed items for road jobs. Do
not include the bracketed item for small parking lot
jobs.**

Provide and maintain temporary signs, signals, lighting devices, markings, barricades, and channelizing and hand signaling devices [in accordance with DOT D-6.1] to protect personnel and new construction from damage by equipment and vehicles until the surface is approved by the Contracting Officer.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Bituminous Concrete Mix

**NOTE: Select bracketed state reference based on the
location of the project.**

[VDOT RBS, Section 211, Type SM-2A] [NCDOT RS, Section 645, Type I-1] [MDOT CM, Section 904.06, SC, Type A] [DCDOT HS, Section 402, Class C Surface Course] [PRHA RBC, Specification 401, Type S-1] [WVDT DHSSRB, Section 401, Wearing 1] for material and mix. Provide crushed stone aggregates for the bituminous mix.

2.1.1.1 Recycled Asphalt Material

Bituminous concrete mix may contain a maximum of 25 percent by weight of the total aggregate material, reclaimed asphalt pavement (RAP). Mix design shall meet the requirements for the type of bituminous concrete specified. Clearly state the viscosity of reclaimed asphalt cement, grade of new asphalt cement, properties of recycling agent if used, and percentage of each in the mix. Combine asphalts and recycling agents to achieve a viscosity of 200 plus or minus 40 pascal-second at 60 degrees Celsius 2000 plus or minus 400 poises at 140 degrees F. Furnish a new job mix formula for each change in percentage of RAP material used.

2.1.2 Stone Base Course

**NOTE: Select bracketed state reference based on the
location of the project.**

**NOTE: Delete the paragraph if the project does not
include the construction of a bituminous concrete
pavement (bituminous surface course, stone base).**

[VDOT RBS, Section 208, Type 1, Size No. 21A, 21B, or 22.] [NCDOT RS, Sections 1005 and 1010 for aggregate base course, standard Size No. ABC.] [MDOT CM, Section 901.01, graded aggregate base.] [DCDOT HS, Section 802.04.] [PRHA RBC, Specification 703-4, Grading Class A or B.] [WVDT DHSSRB, Section 704, Size No. 1 for aggregate base course.]

[2.1.3 Bituminous Tack Coat

**NOTE: Delete this paragraph if the project does not
include the construction of a bituminous concrete
overlay.**

**NOTE: Select bracketed state reference based on the
location of the project.**

[VDOT RBS, Section 310.] [NCDOT RS, Section 605.] [MDOT CM, Section 904.05.] [DCDOT HS, Section 401.02.] [PRHA RBC, Specification 407.] [WVDT DHSSRB, Section 408 and Section 705.4.] Emulsified asphalts shall be diluted at the rate of one part water to one part asphalt.

]2.1.4 Paint

NOTE: Use when minor nonreflective pavement markings are required for the job. Delete the paragraph and edit Section 02761, "Pavement Markings," if extensive pavement markings or reflective pavement markings are required.

FS TT-P-1952, white, unless indicated otherwise.

]2.2 MIX PLANT

NOTE: Select bracketed state reference based on the location of the project.

[VDOT RBS, Section 211.12.] [NCDOT RS, Sections 610-5.] [MDOT CM, Section 915.] [DCDOT HS, Section 918.] [PRHA RBC, Specification 401-3.] [WVDT DHSSRB, Section 401.]

PART 3 EXECUTION

3.1 INSTALLATION AND APPLICATION

NOTE: Select bracketed item based on job requirement (bituminous overlay versus a new bituminous concrete pavement section).

Provide a [tack coat and a bituminous concrete overlay] [and a] [stone base course, and a bituminous concrete surface course]. [Subgrade preparation shall be as specified in Section 02315N, "Excavation and Fill."]

3.1.1 Stone Base Course Placement

NOTE: Delete the paragraph if the project does not include the construction of a bituminous concrete pavement (bituminous surface course, stone base).

Begin spreading base material at the point nearest the source of supply. Permit traffic and hauling over the base. Fill ruts formed by traffic and reroll. After base course placement, continue machining and rolling until surface is smooth, compacted, well bonded, and true to the designed cross section. Compact to 100 percent ASTM D 698 maximum dry density. Maintain the base smooth and true to grade and cross section until bituminous concrete placement.

[3.1.2 Bituminous Tack Coat Placement

**NOTE: Delete paragraph if the project does not
include the construction of a bituminous concrete
overlay.**

Provide tack coat on existing pavement to be overlaid at the rate of 0.10 gallon residual asphalt per square yard 0.453 liters residual asphalt per square meter. Thoroughly clean surfaces to receive the tack coat immediately prior to application of tack coat. Tack coat shall be tacky at the time of bituminous concrete placement.

]3.1.3 Bituminous Concrete Application

3.1.3.1 Placing Temperature

Minimum temperature of bituminous concrete during placement into mechanical spreader shall be 107 degrees Celsius 225 degrees F. Mixtures which have a lower temperature shall be rejected.

3.1.3.2 Joints

Where new pavement abuts existing bituminous pavement, cut existing surface course along straight lines approximately 150 mm 6 inches from edge. Cuts shall be vertical and extend the full depth of the surface course. Prior to bituminous concrete placement, apply asphalt cement to exposed edges of cold joints.

3.1.3.3 Spreading and Finishing Equipment

**NOTE: Include the bracketed item when the project
includes the construction of an overlay over a
milled surface.**

Spread the bituminous concrete to a uniform density and produce a smooth finish, true to cross section and free from irregularities. Provide [electronically controlled] adjustable screeds to shape the surface to true cross section.

3.1.3.4 Bituminous Concrete Placement

As continuous as possible. Place in maximum 50 mm 2 inch lifts. Avoid passing rollers over unprotected edges of bituminous concrete prior to bituminous concrete cooling. If rollers pass over unprotected edges of bituminous concrete prior to cooling, cut bituminous concrete back to expose full depth of bituminous concrete. Immediately prior to resumption of bituminous concrete placement, coat exposed edges of bituminous concrete with asphalt cement. When bituminous concrete placement resumes, rake the hot bituminous concrete against asphalt cement and compact.

3.1.3.5 Featheredges

Accomplish featheredging by raking out the larger aggregate as necessary and sloping the pavement uniformly throughout the featheredge to create a

smooth transition. Unless indicated otherwise, featheredge transition shall be 3.05 m 10 feet.

3.1.3.6 Compaction

NOTE: Select bracketed state reference based on the location of the project.

[VDOT RBS] [NCDOT RS] [MDOT CM] [DCDOT HS] [PRHA RBC][WVDT DHSSRB] for equipment and compaction procedures, modified to compact bituminous concrete to 96 percent of maximum laboratory density. Finished surface shall be uniform in texture and appearance and free of cracks and creases.

3.1.3.7 Protection

No vehicular traffic shall be allowed on pavement for a minimum of 6 hours after final rolling, or until bituminous concrete has cured, whichever is longer.

[3.2 PAVEMENT MARKINGS

NOTE: Use when minor nonreflective pavement markings are required for the job. Delete the paragraph and edit Section 02761, "Pavement Markings," if extensive pavement markings or reflective pavement markings are required.

Unless indicated otherwise, provide painted lines 100 mm 4 inches in width. Apply paint after bituminous concrete has cured for a minimum of 7 days, and minimum ambient temperature is 4.4 degrees Celsius 40 degrees F. Apply paint to clean, dry surfaces, and protect surfaces from traffic until dry. Provide uniform paint film of sufficient thickness to completely conceal pavement.

]3.3 FIELD QUALITY CONTROL

3.3.1 Sampling

Provide new materials where samples are taken. Take the number and size of samples required to perform the following tests.

3.3.1.1 Bituminous Concrete Sampling

- a. Job Mix: Take one initial sample and one sample for every 362,840 kilograms 400 tons or fraction thereof.
- b. Thickness: Take one sample for every 418 square meter 500 square yards or fraction thereof.
- c. Density: One field test for every 836 square meter 1000 square yards or fraction thereof, and one laboratory test for the project. Provide minimum 100 mm 4 inch diameter cores if nuclear testing is not used.

3.3.1.2 Stone Base Course Sampling

- a. Thickness: Take one sample for every 418 square meters 500 square yards or fraction thereof.
- b. Density: One field test for every 836 square meters 1000 square yards or fraction thereof, and one laboratory test for the project.

3.3.2 Testing

Provide for each sample.

3.3.2.1 Bituminous Concrete Testing

- a. Job Mix: Determine gradation and bitumen content.
- b. Thickness: Maximum allowable deficiency shall be 6 mm 1/4 inch less than the indicated thickness. Average thickness shall be as indicated.
- c. Density, In Place: ASTM D 2922 and ASTM D 3017; cored sample ASTM D 1188 or ASTM D 2726.

3.3.2.2 Stone Base Course Testing

- a. Thickness: Maximum allowable deficiency shall be 1/2 inch 13 mm less than the indicated thickness. Average thickness shall be as indicated.
 - b. Density: ASTM D 1556 or ASTM D 2922 and ASTM D 3017.
- End of Section --